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Successful Methods

CONSTRUCTION · ROAD MAKING · ENGINEERING · INDUSTRIAL · MINING

VOL. 2 APRIL, 1920 NO. 4

"Full Steam Ahead"

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Successful Methods

A Magazine of Construction Service

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Vol. II | April, 1920 | No. 4

"FULL STEAM AHEAD"

One of the three words in our April slogan is dead weight. It isn't necessary. That's the word "ahead." It is there simply because in the past there have been times when to avoid accidents it has been necessary to resort to the "Full Speed Astern" signal.

But there is no danger of accident now. We have just had our accident, a war which we didn't want, but had to fight, and fought to a victorious conclusion.

The road is clear now, though; the danger is behind us. So it's "Full Steam" for American business in general, and for the construction field in particular. And that word "Ahead" doesn't belong, because to imagine American business going in any direction but ahead at this time when the opportunities for construction and reconstruction are so vast, is to make a virtue of pessimism.

What if there are bumps in the road or the wheels sink deep in the April mud? Rainy days are part of Nature's plan and they ought to be part of every contractor's plan, too. The man who doesn't make allowance for rainy days doesn't make money either.

Don't make a bid without figuring such items as delays on account of storm, demurrage charges on cars, and the other doubtful items, some of which are sure to crop up. Don't gamble that the sun is going to shine every day but Sundays and that all the needful rain will fall on the Sabbath, when you don't expect to work anyway.

Anticipate the obstacles. That is what the Full Steam is for. It is the vitalizing steam of enthusiasm, of work, of co-operation between workers, no matter to what class they belong, that is going to turn the trick.

Give these forces a chance to show what they can do. Supply the live steam and the old engine will go in the only direction it really knows how to go—ahead.

This Issue Has More Than 75,000 Circulation

EDITORIALS

A Fair Profit on a Road Job

WITH thirty-seven states and the District of Columbia heard from, it begins to look as though a profit of 15 per cent is considered the proper thing on a road job under state auspices. Of the letters from the state engineers which appear in this and last month's issue of SUCCESSFUL METHODS, no fewer than twelve give that figure, and ten give a range of figures which includes 15 per cent. This last group is divided into those which say from 10 to 15 per cent, and those who are more liberal and say from 15 to 25 per cent.

Then there is a group of six states which consider 20 per cent a fair profit, and this select company includes some pretty big and important commonwealths which are leaders in their respective sections of the country. Georgia, Nebraska, New York and Washington are four of the six and their advice is worth listening to in any discussion.

Of course it is evident that no accurate figure can be reached, because one road job varies from another in character in much the same way that one man varies from another in disposition. No two are precisely alike. In addition, as some of the state engineers point out, contractors have different ways of figuring profits. Some include certain items of overhead which others leave out. It is impossible from the very nature of the work to get down to exact figures.

Nevertheless an expression of opinion from more than three-quarters of the state engineers is well worth while. It shows what they think the contractor ought to take home with him after he has finished dealing with them, and inasmuch as some contractors have expressed the opinion that the average state engineer doesn't care whether the contractor himself gets home alive, it is comforting to find that so many of the gentlemen in charge of the nation's great program are willing to state in black and white that they want to see the contractor make money.

And after all 15 per cent isn't such a contemptible figure. It is far higher than any that has been mentioned in connection with the well known Eighteenth Amendment. If you must have more, go to one of the 20 per cent states or tackle one of the few which bid even higher than that. There are roads enough to be built this year to keep everyone busy. The letters from the state engineers indicate that there is money to be made in building them. Go to it.

Materials C. O. D.

IN a considerable number of states the policy of paying for material as soon as it arrives on the job is being tried out. There are various forms which this policy takes but in every case where it is in force in one form or another, it is a step toward the solution of a vexing problem.

Of course the contractor gets the biggest benefit, but it must not be forgotten that anything which helps to speed up the work and gets the roads built is of vast benefit to the general public. The contractor may be the immediate beneficiary, but the public benefits in the long run.

Many states would like to adopt this and similar policies but are prevented from doing so by law. Such laws can be changed. They are on the statutes for the public good and it looks now as though the public good demands that they be revised.

TO OUR CONTRACTOR READERS

THE various state engineers have had their say. Now it's your turn. In this and the March issues of Successful Methods, considerable space has been devoted to setting forth the opinions of those in charge of highway construction in the different states on two questions vital to the industry.

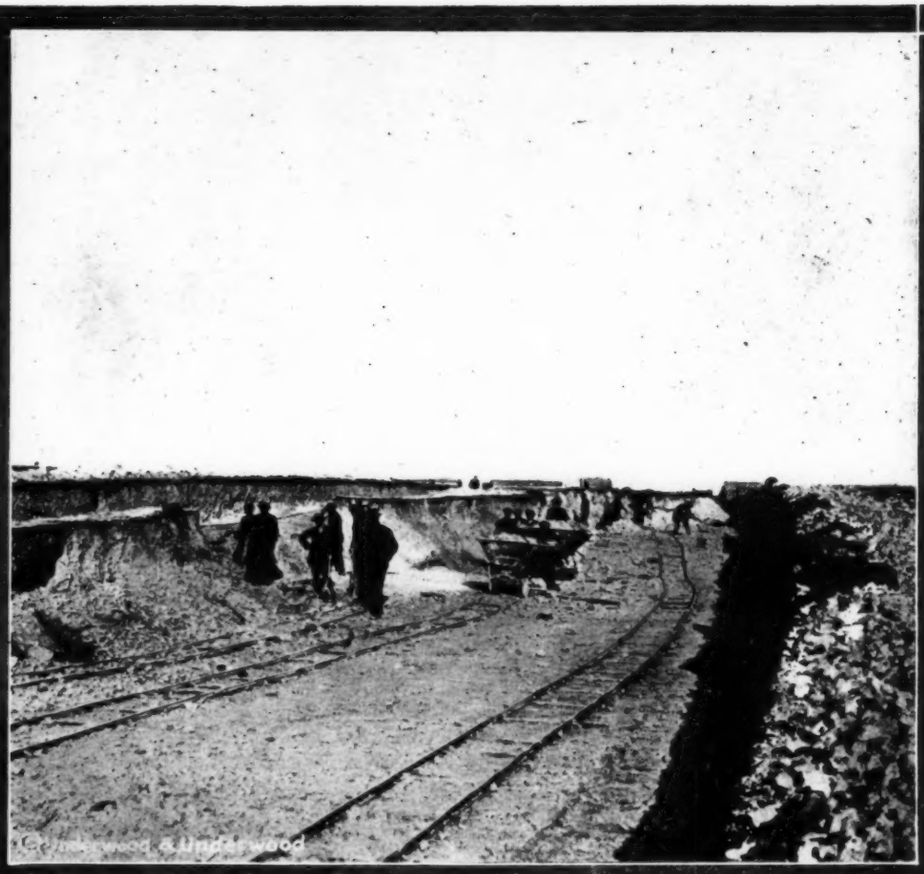
The whole inquiry was suggested by a contractor who said that the state engineers didn't care whether or not the contractor made any money. You have read the answers of the engineers. One and all say they want the contractor to make money. One and all say that they are doing everything possible to cooperate with the contractor. They seem to be sincere.

Their case is in. But what have you contractors to say in reply? Are you getting the cooperation you think you ought to get? Do you know of other ways in which the state engineers can work with you than those mentioned in their letters?

Let's hear your views. Don't let the engineers do all the talking. The columns of Successful Methods are open to all of its readers. The question is an important one, vital to the engineer, vital to the great public which supplies the funds. Write to the Editor of Successful Methods, 140 South Dearborn St., Chicago, and do your share toward finding the answer.

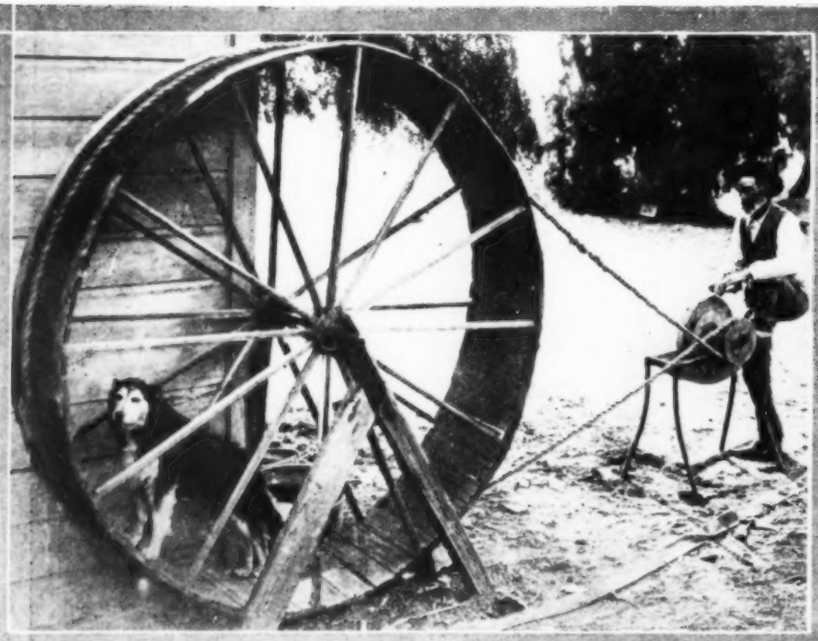
BRITISH ROAD CONSTRUCTION

Returned Soldiers Working on New Motor Highway Between Thornton Heath and Purley in England. They Are Engaged in Leveling the Subgrade and Small Cars Running on Industrial Track Are Used to Carry Away the Excavated Material.



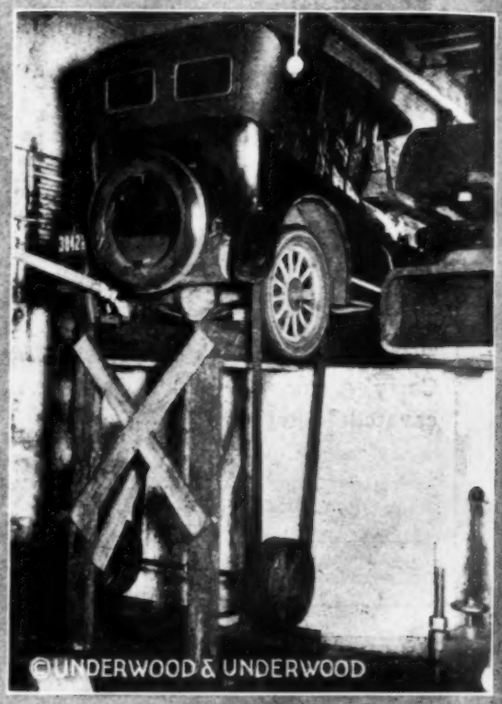
Real Reconstruction in an English City Street. This Machine Is Used to Sift Old Road Material, Thus Making it Possible to Use Much of it Over Again in Rebuilding the Street.

FIT THE METHOD



The Contractor Who Finds it Necessary to Keep Tools Sharpened While Out on the Job Might Borrow a Dog and Try This Scheme.

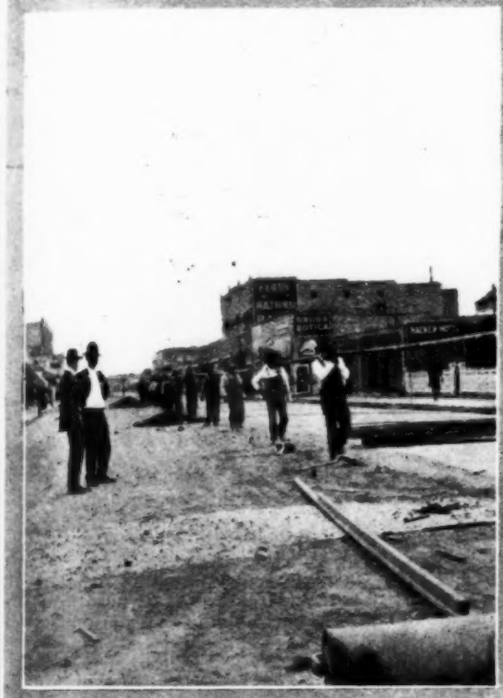
How a Chicago Manufacturer Makes His Car Earn Its Keep While He Is Busy in His Office.



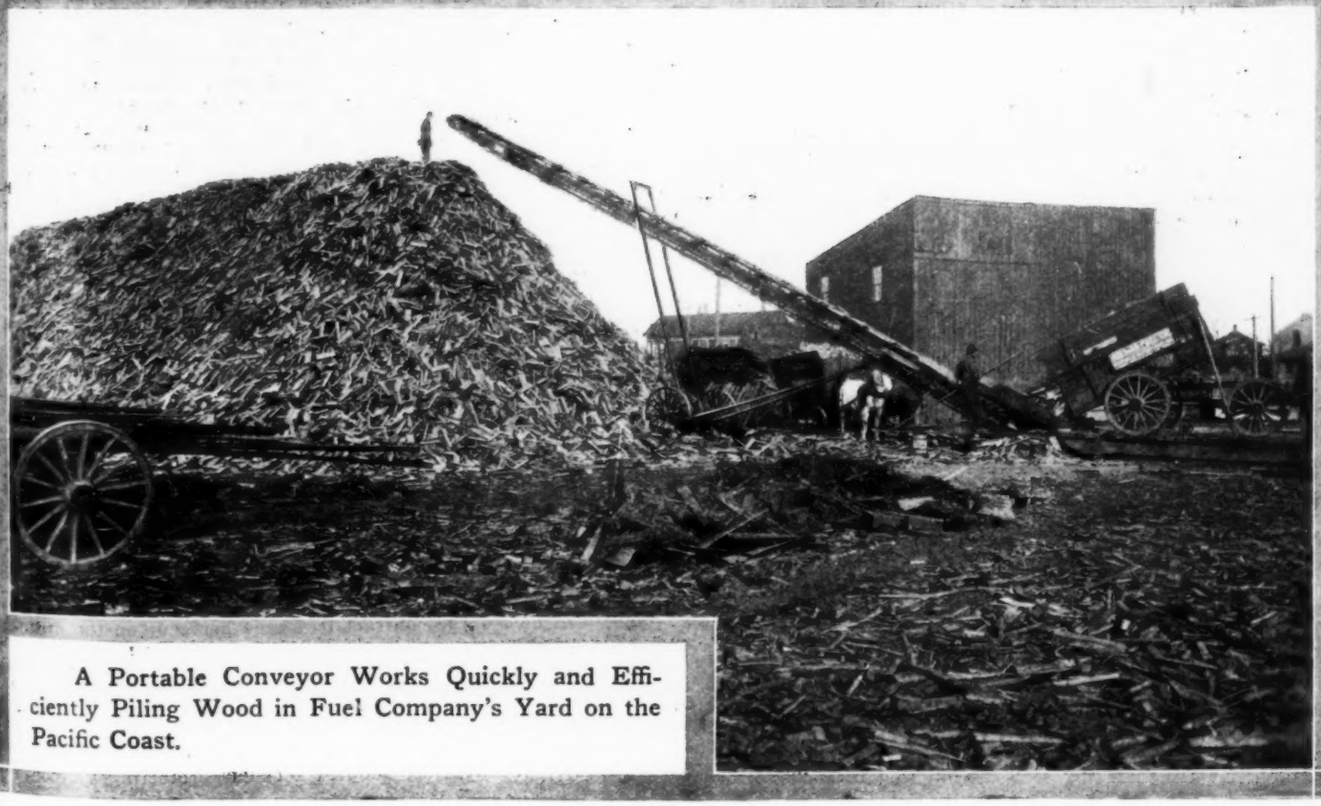
Wholesale Snow Shoveling With Electrically Driven Equipment in the Streets of Boston.

TO THE JOB

Down in New Mexico, Where Labor Is Plentiful and Not too Expensive, They Pick up Two Blocks of Pipe at a Time and Move it.



Out in California, Bent Brothers of Los Angeles Report that "You Can't Beat the Old Hay Burner for Certain Jobs." This Animal Is Helping to Build a Circular Reservoir.



A Portable Conveyor Works Quickly and Efficiently Piling Wood in Fuel Company's Yard on the Pacific Coast.

ROAD MAKING AND MONEY MAKING

More State Engineers Say They Believe in Co-Operation With Contractors

(In the March issue of Successful Methods more than a score of state engineers answered the two questions which are printed below. The other replies received are printed here.)

Arkansas

WITH commendable frankness, V. P. Knott, State Engineer of Arkansas, puts some of the troubles of the road building business squarely up to the contractors. Poor estimates of costs, bids with strings attached and unbalanced bids are named by him as three of the reasons why there is considerable dissatisfaction. He say his department is trying to help out by making specifications just as definite as possible. His letter:

Editor, Successful Methods,

Dear Sir:

In answer to your questions regarding co-operation between engineers and contractors and other matters.

1. In my opinion a contractor should have a profit of about fifteen per cent upon work for which he furnishes labor and materials.

2. As to co-operation with contractors, the Arkansas Highway Department does not have direct charge of the work, but is an interested party through the State and Federal aid allotted to the various districts.

During the last year many of the contracts made had special clauses providing for the payment by the District of the premium on surety bonds; for increase in freight rates and for allowing the contractor a percentage upon material stored. The Department and the District have co-operated with contractors in obtaining an adequate supply of freight cars in taking advantage of freight rate reductions, in locating new sources of materials and in obtaining labor.

In some cases the contractors themselves have made it very difficult for the fullest co-operation between them and the engineers. Proposals submitted by some show unbalanced bids and frequently bids are accompanied by so many conditions or "strings" upon them that they can not be considered. In addition the prices bid at some lettings show that the contractors have made little effort to ascertain or figure their costs, a difference of 50 per cent being shown between bids for the same unit upon a single letting.

The Districts and the Department are co-operating in amending specifications so as to make them as definite as possible and as fair and reasonable as they can be made, and we hope as a result to have more intelligent and business-like bids from the contractors.

Yours very truly,
V. P. KNOTT,
State Highway Engineer

The Two Questions

1. What do you think is a fair percentage for the contractor's profit on a road job?

2. What steps are you taking toward cooperation with contractors?

Florida

THE new State Highway Engineer of Florida, Charles A. Browne, believes in helping the contractor in every way that he can. Liberal extensions of time are granted when contractors are unable to complete their contracts by reason of unlooked for circumstances beyond their control. Mr. Browne says:

Editor, Successful Methods,

Dear Sir:

In reply to your first question, will say that the percentage of a contractor's profit should vary in accordance with the conditions under which he is working. A contract involving the use of a costly plant and possessiong many uncertainties would naturally cause a contractor to include a larger percentage of contingencies, which might result in profit, than one requiring little in the way of plant and nothing in the way of uncertainties.

On the former I think the contractor should be satisfied with a profit of from 20% to 30% while on the latter a profit of from 10% to 15% would be fair. As to the second question, it is the policy of our Department to assist the contractor in every way we can. A clause has been inserted in the specifications to provide for reimbursing the contractor for any increase in freight rates and also to pay 85% of the value of the material delivered at the site of the work.

When a contractor fails to complete his contract within the specified time on account of scarcity of labor, inability to secure material, or for any good and sufficient reason, the Department has not hesitated to grant an extension of time for completion.

Yours very truly,
CHAS. A. BROWNE,
State Highway Engineer.

Georgia

AN unusual form of contract is described briefly — almost too briefly — in the letter received from W. R. Neel, State Highway Engineer of Georgia. It is a sort of cost plus arrangement with some of the objectionable features of the cost plus contract eliminated. Mr. Neel writes:

Editor, Successful Methods,

Dear Sir:

I have your letter of recent date in regard to co-operation with contractors.

I think in the neighborhood of 20 per cent is about a fair profit for a contractor to make. Greater or less according to the magnitude of the project or amount of equipment required.

We have a contract form that provides for construction, based upon the cost plus plan, though we do not call it a cost plus contract. The idea in this contract is to protect the contractor as well as the State from loss.

A contractor makes a bid, setting forth the unit prices the work actually is to cost, also gives his percentage of profit upon the cost. The basis of award rests upon several features, including the price, percentage of profit, experience of contractor, equipment available, past performance, etc. If the total cost of the project runs less than the contract price a bonus is to be given the contractor in proportion to the amount saved.

In case the cost runs above the contract price, a percentage is deducted from the contractor's profits, not exceeding 50 per cent of the total profits, thus protecting the contractor from loss.

Yours very truly,
W. R. NEEL,
State Highway Engineer

Idaho

NEW clauses inserted for the benefit of the contractor are being prepared by Idaho's Bureau of Highways. One clause protecting the contractor against raises in freight rates already is in operation and more are to follow. D. P. Olson, Director of Highways, writes:

Editor, Successful Methods,

Dear Sir:

In answer to your questions I would say that a fair profit for a contractor on road work should range from ten per cent on a large contract to fifteen per cent on the ordinary sized contract. On a small basis of work the average profit should run higher as this would only cover the necessary overhead expense which does not show up in the cost data.

Our specifications are being revised and it is expected that the new clauses will benefit the contractor. For instance, we have just adopted a clause protecting the con-

tractor against any raise in the freight rates and on the other hand providing for a refund to the state in case freight rates are reduced. The clause limiting the time in which the work may be completed has been made very liberal so as not to cause the contractor or state any unnecessary hardships.

We have found that on state work it is impossible to use specifications which might be approved for private work, as the state is restricted by statutory requirements which do not apply to contracts between private corporations and their contractors.

Yours very truly,
D. P. Olson,
Director of Highways.

Illinois

IN three ways Illinois is sharing the burden of increased expense with the contractor, according to Clifford Older, Chief Highway Engineer. Estimates on material are paid as soon as material is unloaded, an extra payment is made for storage of cement, and additional payments are made when freight rates are increased after contracts are awarded. His letter:

Editor, Successful Methods,

Dear Sir:

Replying to your letter of recent date, I would say in answer to your question No. 1 that on road work costing from $30,000 to $40,000 per mile an absolutely clear profit of 10 per cent would, in my judgment, be fair to both the contractor and the public. Just what constitutes profit, however, is a difficult matter to decide in these days of uncertainty. A contractor who would allow not more than 10 per cent on his actual estimate of cost might usually find himself with a loss when he completes the job. Most contractors and engineers as well apply a percentage on the estimate of cost, which percentage is presumed to cover both profit and risk or contingencies. Just what percentage should be allowed for contingencies I am not prepared to say at this time. In figuring costs such items as interest on investment, insurance, surety company bonds, depreciation of equipment and general office overhead should, of course, be included.

In answer to your question No. 2 I would say that we are (a) paying estimates on all material furnished as soon as the same is unloaded. This relieves the contractor from the financial burden that would otherwise apply when materials are unloaded and stored in large quantities anticipating car shortage later in the season. (b) Paying extra for the storage of cement. (c) Paying additional freight charges as freight rates are increased after the award of the contract.

Yours very truly,
Clifford Older,
Chief Highway Engineer

Maryland

COOPERATION depends upon the point of view, in the opinion of J. N. Mackall, Chief Engineer of the State Roads Commission of Maryland. His views on the subject are well put and his statement of the situation in his state indicates that he knows what he is talking about. Mr. Mackall says:

Editor, Successful Methods,

Dear Sir:

The percentage to which the contractor is entitled depends on a great many circumstances, and this percentage would be increased or diminished, depending upon the amount of overhead expense to which contractors are subjected.

The question of co-operation between the contractor and the engineer strikes primarily at the heart of the discontent existing today, but is not the word "co-operation" a hackneyed one, and does it mean anything at this time? When a contractor has signed a contract and given bond, all of the co-operation which the engineer can give him will not make him a profit on the job, if his price is too low, and on the other hand, all of the lack of co-operation will not break him if his price is high enough. To my mind, the question of co-operation or lack of it depends absolutely upon the point of view. In my long experience in the highway construction field, and in my dealings with contractors, I have found that whenever a contractor is making money, he feels that he is getting real co-operation from the engineer, and when he is losing money, he feels that even a fair and liberal interpretation of the specifications is persecution on the part of the engineer. The question of co-operation, therefore, as I see it, has little or nothing to do with the general feeling of the engineer toward the contractor.

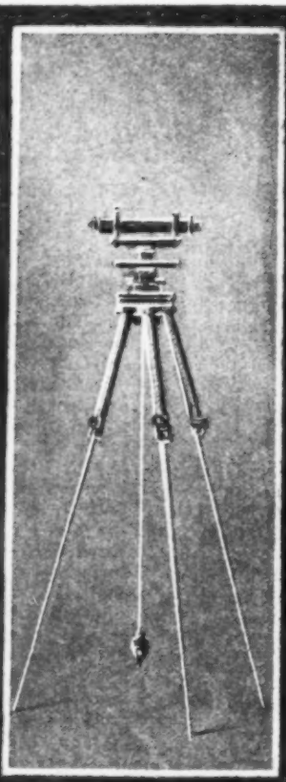
We are particularly fortunate in this State, we believe, in that the contractors with whom we do business almost without exception feel that the department is trying in every way to co-operate with them, and new contractors coming in are very apt to remain of the opinion that they are getting the proper co-operation, simply because the department has a record for co-operation.

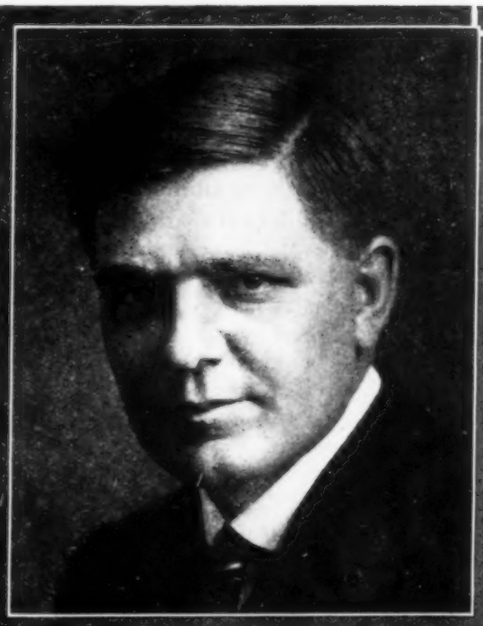
R. G. Collins, Jr., of Cumberland, Md., a contractor with considerable experience along general lines and in highway work, it seems to me, struck the core of the whole proposi-

CAREFUL WORK ON A PENNSYLVANIA ROAD. NOTE THE NEATNESS OF THE SLOPES AND THE MEN IN THE FOREGROUND PREPARING EXCAVATION FOR DRAINS.

A QUARTET OF STATE ENGINEERS

Arthur R. Hirst as State Highway Engineer of **Wisconsin** has been in full charge of highway work for the last eight years and has in that time supervised the construction of over $40,000,000 of State and Federal Aid work. He was graduated from Maryland State College in 1902 and then became connected with the engineering department of the Pennsylvania Railroad. From 1907-1911 he was Highway Engineer, Highway Division of the Wisconsin Geological Survey. He then took up his present work.





F. R. White, Chief Highway Engineer of **Iowa,** is a native of that state. He completed his engineering course in the Civil Engineering Department of the Iowa State College in 1917. After working with private engineering companies, he entered the employ of the Iowa Highway Department in 1910. Upon the organization of the present Commission in 1913, he became an Assistant State Engineer and, in 1915, Road Engineer. From this position he was advanced to the post of Chief Engineer, succeeding T. H. MacDonald, now Director, Bureau of Public Roads.

Wisconsin is the native state of **D. S. McCalman,** State Highway Superintendent of **Wyoming,** but a great deal of his experience was gained in Missouri and Illinois. He engaged in construction work on various railroads from 1900 to 1915, five years of this time being spent with the Kansas City Terminal at Kansas City, Mo. He then spent one year in road contracting in Illinois and one year in war construction work and maintenance for the Union Pacific railroad, beginning **state highway work in 1919.**

Alexander W. Graham, State Highway Engineer of **Missouri,** studied engineering at the University of Missouri, Columbia, Mo., and after completing his course spent five years as field engineer with a Kansas City firm. Later he engaged in road and pavement work in Jackson County, Mo., having charge of construction and maintenance of parks and boulevards for the Kansas City Board of Park Commissioners. He was appointed to his present post March 21, 1917.

tion in his recent article in the "Engineering News-Record." He makes the point that highway contractors as a class are not making money because they are taking the work too low, and I believe that a great deal of criticism of the highway departments is caused directly, if not solely, by the fact that the contractor is actually losing money on his contract. I believe that if you will put the matter to a hundred reputable contractors in the light of Mr. Collins' article, that they will agree with you that co-operation, or lack of it, plays little or no part in the progress of the work, or in the percentage of profit made on any job.

Very truly yours,
J. N. MACKALL,
Chief Engineer

Massachusetts

THE Old Bay State has a reputation for doing things well. Therefore the statement made by A. W. Dean, Chief Engineer of the Massachusetts Highway Commission, to the effect that so far as cooperation with contractors is concerned he is doing just what has been done for 25 years, doesn't necessarily mean that he is behind the times. The chances are that the other states are gradually catching up to Massachusetts. Mr. Dean's letter:

Editor, Successful Methods,

Dear Sir:

I have your letter of recent date and in reply thereto would say that it is my opinion that a fair percentage for contractor's profit on a road job would be from 10 to 15 per cent. Of course, I am assuming that the overhead charges, depreciation of machinery, etc., are to be included in the cost.

With reference to co-operation of contractors, would say that the Department is not doing anything different from what the old Highway Commission did for twenty-five years in relation to co-operation. It has been the practice to co-operate with the contractors by furnishing all information possible and frequently when unforeseen conditions have arisen which could not be anticipated by either the contractor or the State, to make extra allowances for such difficulties. During the past two years, the State has also frequently allowed extra compensation to contractors when freight rates were raised after contract had been let.

Yours truly,
A. W. DEAN,
Chief Engineer

Missouri

IN Missouri the State Highway Department believes in cooperation, both before and after bidding. Alexander W. Graham, State Highway Engineer, reports that provision has been made for paying increases in freight rates on materials shipped by rail. Information in regard to sources and nature of material, labor supply, etc., is gladly furnished to contractors. Mr. Graham writes:

Editor, Successful Methods,

Dear Sir:

Replying to your letter of recent date relative to the spirit of co-operation between the average Highway Department and the contractor, I desire to say that the situation here is as follows:

1. This Department in making up estimates provides for a profit to the contractor of 15 per cent of the actual cost of the work.

2. Our policy is to co-operate with the contractor both during the time bids are being received for the work and during the construction period in every possible way. All information available to the Department in connection with sources and character of materials, condition of labor supply, etc., is furnished to contractors upon request. Our contracts are written to include a clause providing for the assumption on the part of the state of increase in freight rates on materials which are shipped by rail.

Yours very truly,
ALEXANDER W. GRAHAM,
State Highway Engineer

Nevada

A MEETING at which the contractors were asked to air their grievances was conducted recently by the Nevada Department of Highways. C. C. Cottrell, State Highway Engineer, was so pleased with the results of the meeting that he expects to follow it up with others. He says:

Editor, Successful Methods,

Dear Sir:

Answering your two questions, will say:

1st. That we consider a contractor should have a profit of 15 per cent on his total expenditure and our estimates are based accordingly.

2nd. We are very desirous of co-operating to the fullest extent with our contractors and to that end do everything consistently possible to assist them in their work, for we appreciate the necessity of the fullest co-operation in this part of the country. We recently invited all the contractors and prospective bidders on our mailing list to meet with us in Reno to discuss matters of mutual interest and to listen to any grievances which they might have. The meeting was harmonious in every respect. We endeavored to tell them of the faults we found and hoped for them to do the same. I am sure all of us derived considerable good from this meeting and we intend to have others later.

Very truly yours,
C. C. COTTRELL,
State Highway Engineer

New Jersey

CONTRACTING is a purely business proposition and should be regarded as such. That is the opinion of W. G. Thompson, State Highway Engineer of New Jersey. His last paragraph should be read carefully by everyone interested in this discussion. Mr. Thompson says he doesn't care to discuss the question of cooperation and then proceeds to give one of the most clear and lucid discussions of the entire series. He writes:

Editor, Successful Methods,

Dear Sir:

I consider 10 per cent a fair profit for contractors on highway work. If the contractor is competent, well equipped and has the financial resources necessary to properly conduct his work and is dealing with fair minded public officials there is no greater risk incurred in the prosecution of highway construction than in any other industrial or commercial activity. It is fully realized that in the north the highway contractor can work only from 7 to 9 months in the year, which condition does not obtain in the ordinary manufacturing or commercial pursuits.

We notice a marked tendency to severely criticise great industrial organizations if their profits exceed 6 per cent per annum, and although I know many highway contractors will add from 12 to 20 per cent for profit, I feel 10 per cent is a very fair profit. The contractor might argue that he does not always have fair minded public officials to work under. I contend that he should very thoroughly investigate this phase of the matter before embarking his money in it, just as any other merchant or business man would investigate the factors which would tend to increase or decrease his profits before entering into any business proposition.

The method employed by this department to effect co-operation with contractors is first to provide the fullest information possible covering the work to be performed, to have careful investigations made during surveys and before plans are supplied, then to have complete plans showing every item and type of construction and very explicit specifications. If, during the prosecution of the work, it should develop that information given the contractor by this department was misleading, the department will make adjustments which will be mutually satisfactory.

I do not care to enter into a discussion of whether or not there exists a spirit of co-operation between the highway contractor and the highway official. Hundred of contractors were lured into the road building game by the prospects of easy money and in the belief that anybody could build a road. Of my own personal knowledge, dozens of them were equipped neither mentally, in resources or in equipment to handle the work. When they were required to live up to the require-

ments of the specifications and plans they considered they were being imposed upon. On the other hand, I have knowledge of instances where the petty restrictions and inexperience of engineers and inspectors have caused the contractors a great deal of unnecessary expense.

There is admittedly room for a great deal of improvement, but I feel that most of the objections of both sides will have disappeared when capable, responsible men, with experience and resources enter the highway construction business and when information furnished by the Engineering Departments is so complete and so transparent as to be easily understood and when the requirements of the specifications are clear and unmistakable.

Yours very truly,
W. G. THOMPSON,
State Highway Engineer

AN OHIO ROAD SHOWING DANGER SIGN

Oregon

THE brevity of the message from Herbert Nunn, State Highway Engineer of Oregon, is due to the fact that it came by telegraph. Mr. Nunn wanted to be sure that Oregon was on record in this important matter. He wires:

Fair profit for contractor is from 15 to 25 per cent, depending on size of job, type of construction and amount of equipment used. We are co-operating with contractors to the extent of guaranteeing freight rates, paying for all materials as soon as delivered and by furnishing asphalt and cement, which in reality guarantees the prices.

HERBERT NUNN,
State Highway Engineer

South Carolina

PROTECTION against increases in freight rates made after proposals are submitted is one of the policies of J. Roy Pennell, State Engineer of South Carolina. He says:

Editor, Successful Methods,
Dear Sir:

Replying to your letter of recent date, I beg to reply to your questions as follows:

1. I believe that a contractor should make 15 per cent profit on highway work.

2. We are attempting to give contractors all information possible relative to a project before bids are received, and this Department has agreed to protect contractors against any increase in freight rates upon materials which remain in the work, provided, of course, that such increase in freight rates is made after the proposals are submitted.

Yours very truly,
J. ROY PENNELL,
State Highway Engineer

Virginia

IN an effort to help contractors, Virginia has adopted the policy of paying in advance for materials on the ground. G. P. Coleman, Highway Commissioner, says:

Editor, Successful Methods,
Dear Sir:

I am just in receipt of yours of recent date, and in preparing our estimates of the cost of work we are allowing a contractor's profit of 15 per cent, which after a great deal of discussion we have concluded is a fair percentage.

Your second question is very much more difficult to answer. We are trying in every way possible to facilitate the work of contractors, particularly co-operating with them in getting prompt delivery of materials, going so far as to arrange for payments on the delivery of materials on the ground, in advance of the actual beginning of the work.

Yours very truly,
G. P. COLEMAN,
Commissioner

Washington

WHEN matters beyond the control of contractors have intervened in road jobs, the State Highway Commission of Washington has done all in its power to relieve the contractor. That is the idea of cooperation expressed by James Allen, State Highway Commissioner, who says:

Editor, Successful Methods,
Dear Sir:

I wish to acknowledge receipt of your letter of recent date requesting reply to certain questions set forth therein.

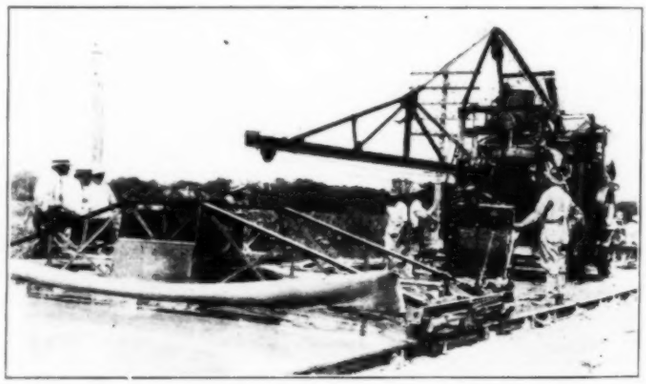
In reply I wish to advise that it is the opinion of this department that contractors are entitled to a fair percentage as contractor's profit on their contracts for highway improvements, and while some contractors are entitled to a definite percentage of profit, others may not be on account of their inability to handle their work efficiently and economically. An average contractor, however, should realize a profit of from fifteen to twenty-five per cent.

This department has been co-operating to the fullest extent with contractors in handling their work and has always given consideration to matters beyond the control of the contractors and where possible has done all in its power to relieve them.

Yours very truly,
JAMES ALLEN,
State Hignway Commissioner

West Virginia

SUPPLEMENTAL contracts to cover unforeseen contingencies help the contractor who does road work in West Virginia. C. P. Fortney, Chairman of the State



FINISHING MACHINE—IN USE IN KANSAS

Road Commission, also says that every effort is made to give the contractor sufficient information before he bids.

Editor, Successful Methods,
Dear Sir:

In reply to your letter of recent date.

In answer to your question, "What do you think is a fair percentage for contractor's profit on a road job?" I should say from 15 to 20 per cent.

In reply to your second question, "What steps are you taking toward co-operation with contractors?" First, we are endeavoring to give them sufficient information to make an intelligent bid; second, that if any unforeseen contingencies arise or for some special reason, supplemental contracts have been entered into.

It is the purpose of the Commission to be as fair to the contractor as possible, and in return the Commission expects the work to be completed in good shape.

Trusting that the above information may be of service to you, I am Very truly yours,
C. P. FORTNEY,
Chairman, State Road Commission

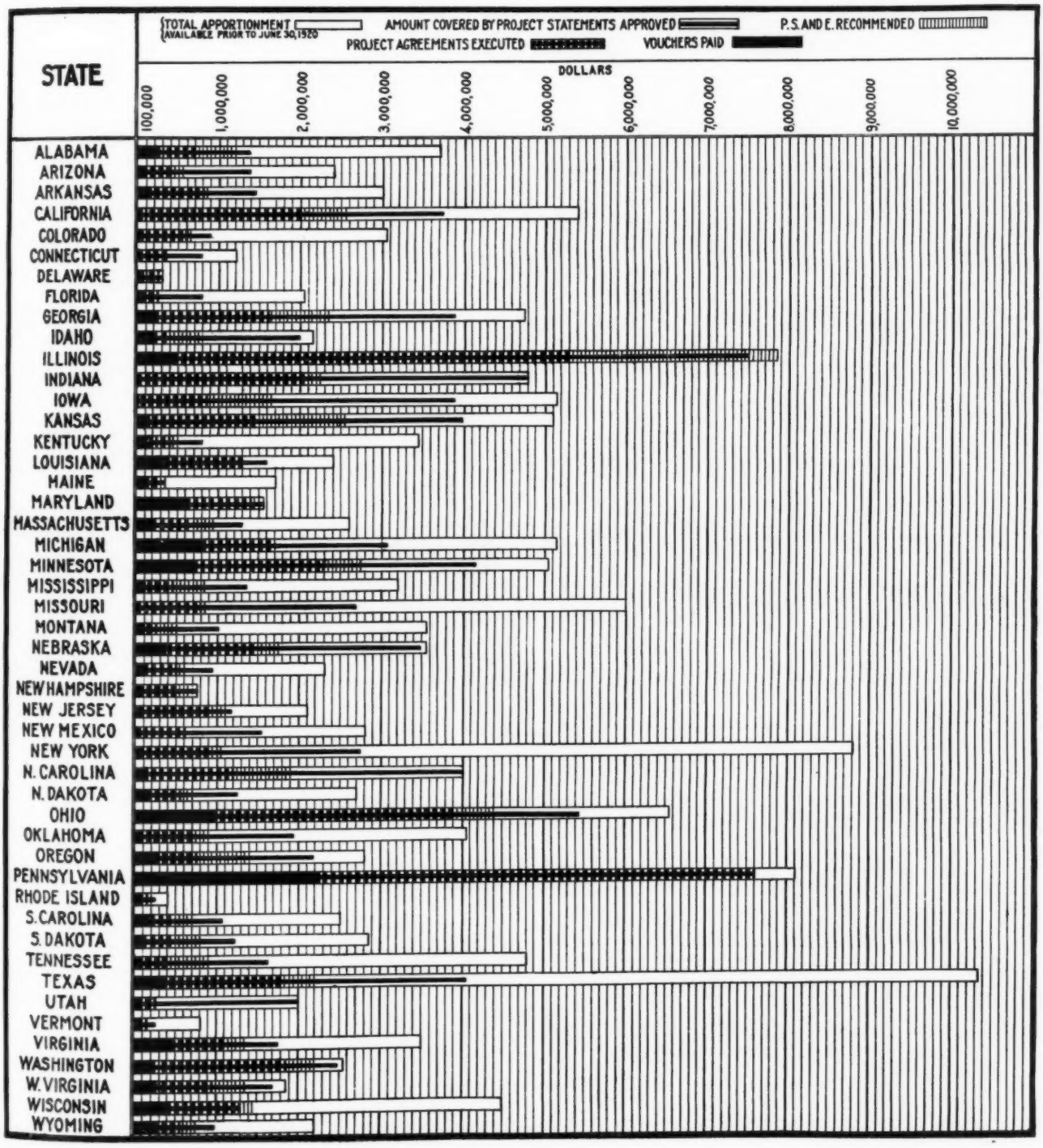
STATUS OF FEDERAL AID FUNDS

Chart Showing How States are Making Use of Government Moneys

THROUGH the courtesy of Thomas H. MacDonald, Director of the United States Bureau of Public Roads, SUCCESSFUL METHODS is able to print the chart which appears on this page. It shows graphically the extent to which the various states have absorbed the Federal Aid funds allotted to them up to December 31, 1919.

The amount assigned to each state by the government, the projects completed and various other details are recorded. Take Texas, for example, the state with the greatest area and the biggest Federal aid appropriation. The chart shows that the sum of $10,350,000 has been allotted to Texas; that project statements to the extent of $4,050,000 have been approved; that plans, specifications and estimates to the amount of $2,200,000 have been recommended; that project agreements totaling $1,800,000 have been executed, and vouchers for $400,000 actually paid.

On July 1, 1920, there will be a further apportionment of $100,000,000 in Federal Aid Funds.



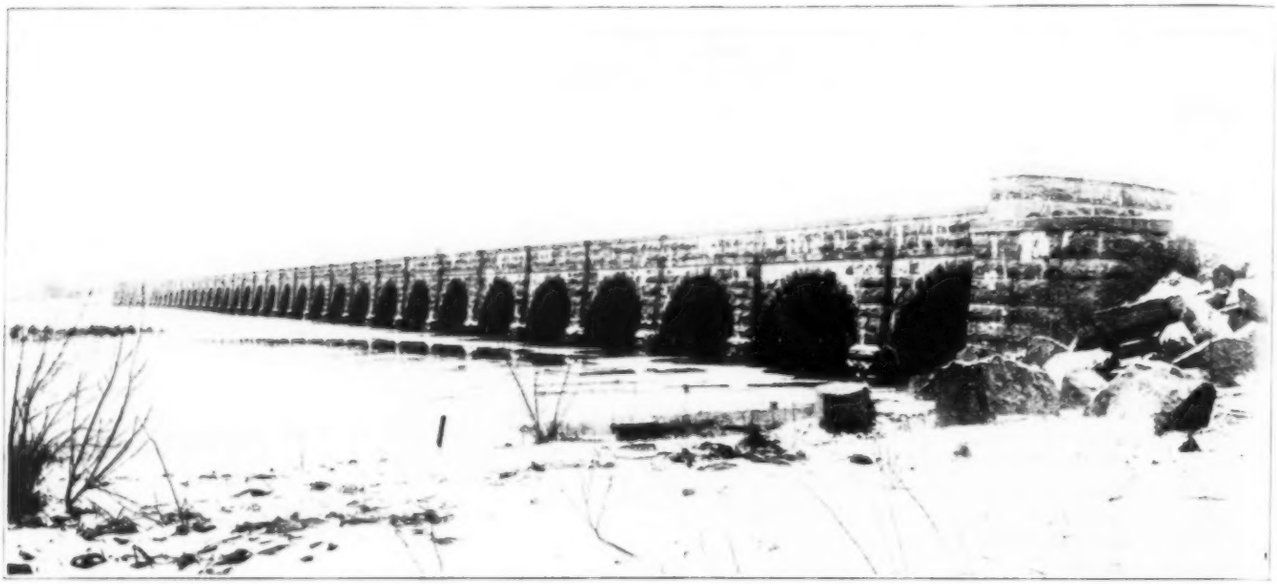
IT STOOD THE TEST OF TIME

Removal of Montezuma Aqueduct Built More Than 50 Years Ago Proved Skill of Engineer Who Built It

By Gordon P. Gleason.

THE completion of the New York State Barge Canal, while resulting in the construction of many remarkable engineering structures, has removed an old one which, in its day, was hailed as a great engineering feat. This is the old Montezuma Aqueduct that has carried the old Erie canal over the Seneca river and marshes since 1856.

When the original Erie canal was being constructed the danger point encountered by the engineers was located at the treacherous bog created by the Seneca river near Montezuma. Repeated efforts were made to circumvent this but, as none of these proved successful, it was decided to construct an aqueduct over the river and marsh. To do this was no simple matter in those days. The job was entrusted to Van Rensselaer Richmond, who later served three terms as state engineer and surveyor of New York. Mr. Richmond designed the aqueduct and, in order to overcome the quicksand that made it impossible to sink piles in the bog, caused a heavy timber raft 1,800 ft. long to be sunk in the marsh by means of cross cribs filled with stone. This accomplished, thirty-one masonry piers were constructed on the cribs, the span between each being 20 ft. wide and 11 ft. deep. The structure was finally completed in 1856 at a total expenditure of $216,510.63.



When the aqueduct was removed, in 1918, to make way for the modern Barge canal channel, the contractors found it in an excellent state of preservation and engineering authorities who witnessed its demolition said that it could have fulfilled its original mission for countless years to come without being repaired. The old aqueduct shortly after the work of demolition was begun is shown above.

ROAD FORMS WITH SINGLE POINT BEARING

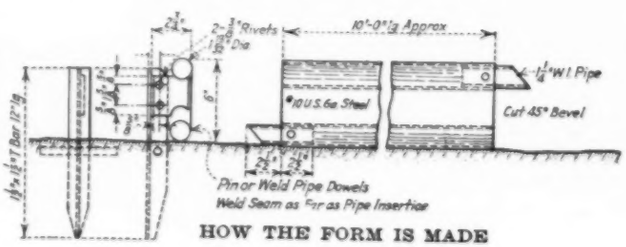
ANYONE who has tried to keep the top of a road form free from mortar, so that the strike board will work right down on the form, appreciates the value of a form without a flat top surface in getting a road down to the last sixteenth of an inch.

A rolled section will stand more abuse than any other shape for the same weight of metal. The form shown in the drawing can be used either end first or either side up. The dowels in each end are identical. This dual arrangement of splicing forms together offers an exceptionally rigid means of holding the form in vertical and lateral alignment. Furthermore, there is no clamp to get out of order frequently.

By having an extra quantity of the stakes on which the form hangs, stakes can be driven some distances ahead of the mixer and forms hung on the stakes when the mixer passes. Where the ground is soft additional supporting stakes must, of course, be used.

There is no exposed metal edge on this form to be battered and no open channels to fill with concrete. The road form stake is made out of a "T" iron, which will drive straighter and truer than an angle iron. A large hole in the stake, just below the ground level, permits the insertion of a long bar or bolt to give additional support in soft ground.

Those who have tried this form say it works well.

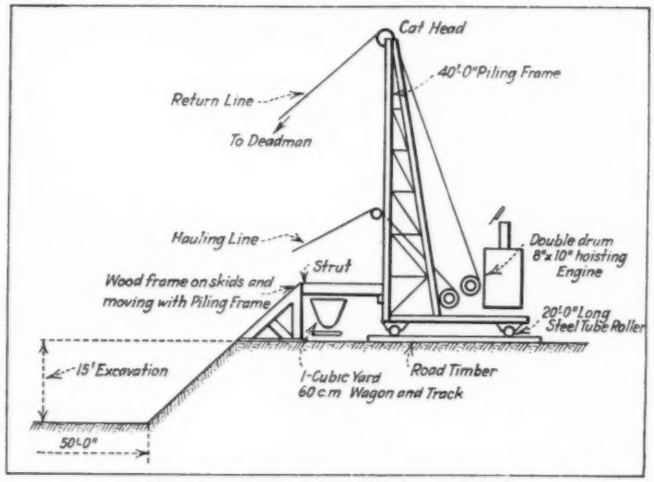


HOW THE FORM IS MADE

PILE DRIVER FRAME USED AS DRAG LINE EXCAVATOR TOWER

By T. F. Young

IN excavating a pump chamber near Belfast, Ireland, an ingenious method was employed. Six-inch timber sheet piling was to be driven, cut off 15 ft. below the ground level in a pump chamber 160 ft. by 50 ft. and the chamber excavated to the 15-ft. depth. The ground was heavy and sticky, somewhat similar to what is called "Gumbo" on this side of the Atlantic.



PILING FRAME IN USE AS TOWER.

The fact that the trench was 50 ft. wide, made timbering difficult and expensive, so it was decided to excavate as an open cut with side stops of approximately 1½ to 1. To do this a home-made dragline excavator was made by a combination of a double drum 8-in. by 10-in. hoisting engine and the piling frame which was brought to the job early and used as the tower.

The equipment was rigged up as shown in the accompanying sketch and after the excavation was finished, the piling frame was lowered into the cut and the piles driven. A considerable saving was effected and the job speeded up materially.

This utilization of the piling frame as a tower during the excavation work kept it busy nearly 100% of the time instead of leaving it idle until the time came for driving the piles.

A BELIEVER IN MACHINERY

H. B. Sproul Knows How to Cut Labor Costs

BY REPLACING labor with labor-saving machinery whenever an opportunity offered, H. B. Sproul, president of the H. B. Sproul Construction Company, Inc., of Scranton, Pa., and Peekskill, N. Y., made an excellent record on his road contracts last year. One of his most important jobs was the state road between Matamoras and Milford, Pa. It was a 6½-mile stretch following the Delaware River and consisted of a 6-in. concrete base with a bituminous concrete top 18 ft. wide. He also completed a 1½-mile job through Moscow, Pa., with brick surface on the hills.

"I will take a chance once, but the machine must make good," is one of his remarks, which illustrates clearly his attitude toward the installation of road machinery.

The photograph shows a bucket loader engaged on one of Mr. Sproul's jobs in Pennsylvania, loading from material piles to hopper and thence to wheelbarrows.

KEEPING AGGREGATES CLEAN

Simple Method of Delivery on Special Trucks Cuts Costs in Maryland Road Job

By John N. Mackall
Chief Engineer, Maryland Roads Commission

ONE of the essential, but too often neglected features of building good concrete roads, is the delivery of clean aggregate to the concrete mixer. Engineers insist on clean stone, sand and cement, and then permit it to be dumped on the subgrade or on the side of the road and to be shoveled up by laborers, which necessarily gets a considerable amount of subgrade and shoulder material into the aggregates.

It seems to the writer that one of the most needed changes in concrete roadway construction is to deliver previously mixed concrete to the point where it is to be deposited, or to deliver properly proportioned batches directly from the source of supply to the concrete mixer used on the work, without the necessity of shoveling this material from the ground into some form of measuring box.

On the State Aid road through the village of Mt. Airy, being done under the supervision of the State Roads Commission of Maryland, on which the People's Lumber & Supply Company is the contractor, the aggregates are being delivered to the work most economically and satisfactorily by the simplest method which has come to the writer's notice. The conditions, however, surrounding this job, are ideal for such a layout. The project is 1.5 miles in length, with the railroad siding for the delivery of materials in the center of the job. There existed at this point a coal trestle a sufficient height above the ground to permit the contractor to erect bins under the trestle, so that the sand and stone could be unloaded by gravity in the bins, and these bins are still sufficiently high to permit them to be emptied by gravity into the trucks on which measuring boxes have been mounted.

One-ton Ford trucks with especially constructed two-compartment bodies were used to transport the material. These bodies, constructed of timber so that they could be dumped by one man, were made in two compartments, each one independent of the other, and each holding 12 cu. ft. of material, making a total load of 24 cu. ft. The boxes were so marked as to permit the placing in them of 8 cu. ft. of stone and 4 cu. ft. of sand.

The trucks then were brought up to a point where the subgrade was shaped approximately 200 ft. in front of the mixer, at which point they were turned around and backed to the loading skip. One of these boxes was dumped, and while this batch was being mixed, the truck was shifted slightly so that the second batch could be dumped directly into the skip.

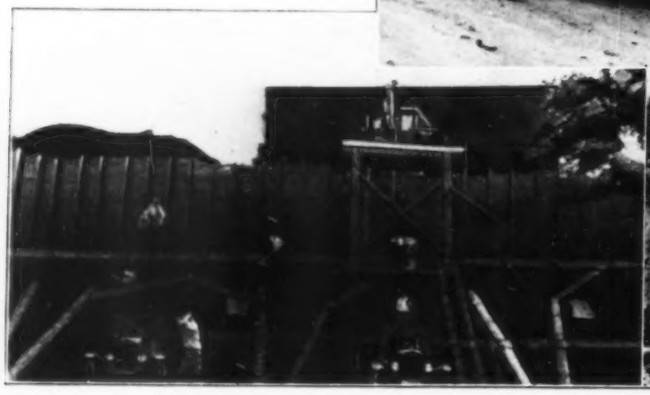
By this method, absolutely clean aggregate was delivered to the mixer, and the cost of unloading, hauling, proportioning, mixing and placing of the concrete was done at the following unit cost:

2 men finishing concrete, at $4.00	$ 8.00
2 men on template, at $4.00	8.00
2 men spreading concrete, at $3.50	7.00
1 man operating bucket, at $4.50	4.50
1 man operating mixer, at $5.00	5.00
1 foreman, at $4.00	4.00
1 man on cement, at $3.50	3.50
1 man cleaning up at hopper, at $3.50	3.50
3 men unloading cars, at $3.50	10.50
2 men loading trucks, at $3.50	7.00
1 foreman, at $6.00	6.00
5 Ford trucks, at $10.00	50.00
1 3-ton truck, at $25.00	25.00
	$142.00

The construction of the dump boxes was unique and worth a complete description. They were made on a pivot located so that the box would remain in place when loaded. The bottom of the box projected about 2 ft. beyond the limit of the body. When the tail gate was open, the material would run out on this projection, and the extra weight would cause the body to tilt back, and the contents to drop into the skip.

This feature enabled the driver to raise and lower the bodies and open and close the doors without moving from his seat, thus eliminating much delay and expense.

The average day's run was 250 ft., or 416 sq. yd., which makes the unit cost 30c per sq. yd., which is unusually low.



AT THE BINS ON THE ROAD AT THE MIXER

HOME MADE REPAIRS

A Skilled Mechanic in Charge of Material Yard Can More Than Earn His Salt

EVERY contractor using machinery and equipment is confronted with the problem of repairing breakages and of giving his plant a general overhauling during the winter months. After a hard season's work there are certain to be loose bearings, loose nuts and bolts and hundreds of other little items that need attention and adjusting before the machinery is sent out in the spring for another year's work.

If such a general overhauling is neglected the life of any equipment is greatly shortened and in addition to that there is the danger of some accident or break occurring in the midst of a job where speed is the all-important factor. For this one reason alone, no modern contractor can afford to take chances and gamble with his profits by risking any kind of breakdown.

REPAIRING A ROLLER WHEEL.

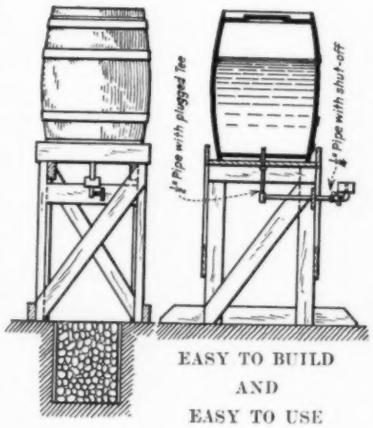
The accompanying photograph shows how one contracting firm in Chicago, John A. McGarry & Company, handles the problem. It has a repair shop completely equipped with machine tools, a forge and oxyacetylene welding outfit, all of which occupy a part of the main storage shed. Here two men are seen welding a broken spoke in a road roller wheel. The wheel is inside the sheet iron cylinder which is filled with charcoal packed around the spokes. After heating for several hours, the charcoal is brushed away from the break and the weld made.

This method has long been in use by the big contractors of the country and is practical, economical and efficient. At least one man must be kept around the storage yards as a watchman at all times, and the substitution in his stead of a skilled mechanic insures equipment going out in first class condition. The cost is no more, and is usually less, than when repairs are made only when absolutely necessary, by the factory, a local machine shop or a foundry. If the right man is in charge the home-made repairs will be real money savers.

CAMP DRINKING FOUNTAIN

How to Make a Successful Drinking Fountain From a Barrel

THE drinking fountain illustrated was made from a 50-gal. cask supported by a wooden frame 2 by 2 by 3 ft. The bubbling jet consisted of a ½-in. pipe inserted in the bottom of the cask and connecting by a plugged tee with a ½-in. pipe extending to the jet. The flow was easily controlled by a valve. An ordinary tin cup was set over the jet in such a way that the lips of the drinker would not touch the pipe. The jet was also inclined slightly to facilitate drinking. Surplus water drained through perforations in the bottom of the cup and was absorbed in a sump 1 by 1 by 1½ ft., dug under the barrel and filled with broken stone. A hinged door at the top permits the filling of the barrel.



EASY TO BUILD AND EASY TO USE

This type of fountain was used by the W. E. Wood Co. of Detroit, Mich., contractors, in the construction of Camp Custer.

One driver with a wagon and two helpers kept the fountain supplied with enough fresh water to provide for a working force of 2,500 men. It combined the virtues of convenience, economy of construction and was so simply made that it wasn't forever getting out of order.

KEEPING DAILY RECORDS OF EXCAVATION

Tally of Loads and Actual Measurement Supply Measuring Data

By Daniel J. Hauer, C. E.,
Construction Economist

"WHAT did our concrete cost us per square yard yesterday?" asked a contractor of his engineer.

"On Job 49, 19.1 ct.; on Job 53, 23.4 ct., and on Job 52, 18.7 ct., all well under the estimated cost of 25 ct. per square yard for labor," was the answer. "This is all right for the concrete, but the cost for excavation is high and we should have some means of figuring the unit costs to see if we are making money."

"Yes," said the contractor, "it is possible to lose on the excavation all that we make on the concrete on these paving jobs. We should have some way of measuring the excavation just as we do the concrete."

This is the demand of many contractors for much can be, and is, lost on excavation and when a check up can be made only against an engineer's estimate, weekly, monthly or at the end of a job, it is not possible to rectify mistakes or correct unsuccessful methods.

It is possible though, to measure or check up nearly all classes of excavation daily or weekly, and to eliminate mere guesses or single estimates. It is proposed to show in this article just how measurements can be made and records kept to apply to cost keeping on earth excavation.

For many classes of excavation the easiest record kept is that of loads. For wagons, trucks, carts and single cars as well as scrapers of all kinds the record can be kept at the dump on a tally or some other form of reclaimed counter. A tally board is recommended because it is easy to make and easy to use. No great amount of intelligence is needed to move pegs or nails from hole to hole in a board.

At the end of the day the record is turned in at the office. With the actual number of loads recorded it is an easy matter to figure the cubic yards moved, if the average size of the load is known. Theoretical or rated capacity loads should not be used as they are apt to be much larger than the actual average load hauled. For instance, in one record kept of 1½ yard drop-bottom dump wagons, loaded by an elevating grader, the average load as recorded by the writer for 100,000 loads was .91 of a cu. yd. and in that car .9 of a cu. yd. was used to estimate each day's work instead of the supposed capacity of the wagon.

In another record of these wagons loaded by hand, the corners of the wagon being well filled, the average load was found to be a cubic yard. Loading wagons by a small steam shovel, without side boards on the wagons, taking one to two dippers to the load, the average was .9 of a cu. yd., while with 6-in. side boards the average load was 1.3 cu. yd. Steam shovel loading shows a wide variation between wagons, but the average calculated from a thousand loads will show little, if any, variation.

The average load of different kinds of scrapers, except 4-wheel scrapers, will run a little less than half of their rated capacity. For instance, a No. 1 drag scraper, usually rated at 7 cu. ft. capacity, carries an average load of 3 cu. ft., running 9 loads to the cubic yard. A wheel scraper rated at 13 cu. ft. will run about 4 loads to the cubic yard. Many wheelers, when loaded by horses, instead of carrying 29 cu. ft. as rated, will carry only about 20 cu. ft., but if loaded either by a traction or hoisting engine, the average load will be in excess of 23 cu. ft., usually 23½.

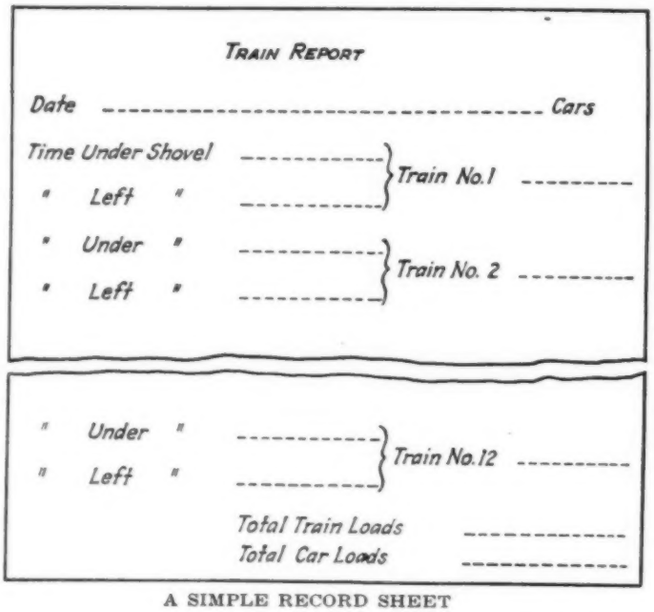
Small cars loaded by hand will average about ¾ of their rated capacity, and large cars only ⅔, although all cars loaded by steam shovels and other power loaders will average about 80% of their rated capacity.

It must be understood that the yardage mentioned in each case is not the bulk of loose material in the vehicle, but the place measurement in the original excavation which is the measurement upon which payment is made for all excavation, except in some cases for dredging when scow measurement is used.

If there is any doubt as to the size of loads an exact record can be kept and the number of loads divided into a given cross section of the excavation. This will give the average load to be used in preparing records. Such records can cover a hundred cubic yards or less, a thousand cubic yards, or a large cut. The writer has kept such records up to 100,000 loads, but it was not necessary to wait until the daily costs were figured, the large record being used as a check only.

For trains of cars a record should be kept of the number of both train and car loads. To illustrate in the case of a steam shovel. The shovel operator keeps a record of the number of trainloads he sends from the excavator. He can do this on a small tally board hung up in the machine convenient to his standing position. Better still, he can have a counting indicator like those used on printing presses or in street cars for registering fares. One with a bell on it is excellent, for when other employees, as the train conductor, foreman, etc., fail to hear the indicator ring, attention can be called to the fact.

Such indicators can be used on all types of excava-

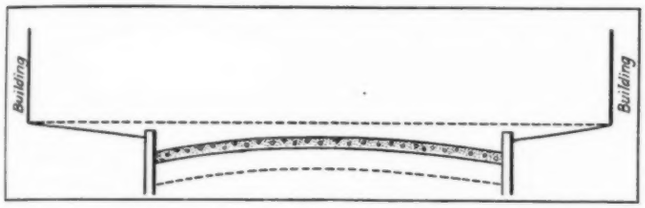


A SIMPLE RECORD SHEET

tors, either for recording train, wagon, car or bucket loads. They can be used on elevating graders, power scrapers, wagon and truck loaders, Dennis graders, trench and ditch excavators and even on bins from which wagons and trucks may be loaded.

The shovel operator reports at the end of the day on a suitable blank, the number of trainloads. The man running the train reports the number of trainloads and the number of cars in each train on a form similar to that shown. The man in charge of the dump keeps a record of the number of carloads dumped and reports it on a form at night. Thus the number of train and carloads are cross checked.

There are jobs upon which it is not easy or practical to keep a record of loads, or where such records will not give a fair estimate of the excavation made as in street and alley work. In such cases it becomes necessary to measure the excavation in place. This can be done in a



MEASURE STREET EXCAVATION IN THIS WAY

simple manner as illustrated. If the curb in a street is not to be disturbed a string can be stretched from curb to curb, marks that can readily be found being made on the curb. If the curb is to be reset, then marks can be made on the sidewalk or on the buildings. A chalk line can be stretched tightly across the street and measurements made to the old street surface. After the grading is done the string again can be stretched between the same marks and measurements made at the same points. The difference between these two measurements less the thickness of the old pavement will show the excavation. From these measurements, the exact yardage excavated can be figured.

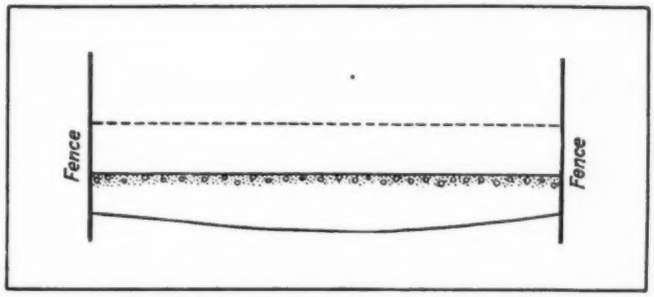
The notes for this can be recorded in a book and the work done each day used in the cost keeping. In one of the illustrations the cross section of the alley is shown. In such work nails can be driven in the fences and the string stretched upon them.

On road work the same method can be followed, using fences, buildings, or driving links or stakes outside the area of excavation. Such measurements are an excellent check upon the engineer's figures. Where regular cross section stakes are set out by the engineer, as in railroad and canal work, a record of these stakes can be made by the contractor or obtained from the engineer, and the quantities in the cuts used in connection with the cost keeping and daily records of work done.

For cellars and foundation pits there should be little trouble in measuring the excavation daily with a level board and tape line. In most cases the excavation can be made along regular lines, so that the measurements are easily taken. Steel pins with red flannel tied to them or stakes driven into the ground either on the surface or the sides of the excavation will show where one day's work was finished and another started. This is the only helper needed to keep a daily record.

Reservoirs, borrow pits and other large areas to be excavated are rather difficult to measure, but here a load record can be kept. Nevertheless, most of these can be measured if the steel pins are used to mark off the work and a level board, string level or hand level is used in connection with a tape and rod.

Trenches and tunnels are easily measured and the



MEASURING EXCAVATION IN AN ALLEY

excavation per lineal foot obtained. It is only necessary to mark the work done each day in order to measure it.

Real estate developments usually call for the grading of streets or roads and these have been commented upon. If large areas are to be graded, then the records can be handled as outlined for borrow pits and reservoirs.

The measuring of any wet, sloppy excavation as in cofferdams, always is difficult to handle, but it is sometimes possible to make marks upon the dam or scaffolding from which the daily depth excavated will give the yardage.

Even if measurements are made of the excavation, it is advisable to keep a record of the loads handled. The foremen and workmen may not understand the record of measurements, but they grasp the significance of the number of loads and in many cases their interest in their work is materially increased. There even may be an attempt by the workmen of their own volition to make one day's record exceed another. Then, too, with two or more gangs working on the same job rivalry frequently springs up and each gang will attempt to exceed the record of the others. With load records it is always possible to offer a bonus to a gang or a prize to several gangs to get out extra loads. This will tend to cheapen the unit cost of the work.

The suggestions made will assist in analyzing costs and obtaining daily a record of unit field costs for any class of excavation. It is even possible to keep a record of wheelbarrow loads and tell approximately the cubic yards of earth excavated.

PORTABLE CAMP BUILDING

A portable building that can be taken apart readily and shipped to another location if desired, thus making it applicable to other temporary or semi-permanent locations, is employed by the Chicago & Northwestern Ry. for housing maintenance of way construction crews. The building illustrated was described in a paper read before the American Railway Bridge and Building Association.

The structure is 8 ft. by 16 ft. over all with a shed roof 7½ ft. high on one side and 8½ ft. on the other. The sides, ends, floor and roof are separate pieces for convenience in handling, transporting, erecting or taking down. It is stated that the building can be taken down and loaded on cars at a cost not exceeding $5, and that it can be unloaded and erected at a new location for a like amount.

CALLING IN THE POLICE

London Bobbies Page Foreman at Movie Shows for His American Employer

AN interesting combination of American energy and British thoroughness is displayed in the following account of an incident which occurred recently in London. The F. D. Huntingdon Company, Ltd., which is headed by Capt. F. D. Huntingdon, a typical American contractor, is engaged in contructing a large addition to the store building now occupied by Selfridge & Co., Ltd.

As many Americans know, the head of Selfridge & Co. is an American, who was formerly in the Marshall Field organization in Chicago. On a trip to England he saw that there was room for a modern department store run along American lines and opened such an establishment in London. It has grown to be the largest single merchandising organization of its kind in England. Its growth has been so great that in order to accommodate the business it is planned to quadruple the present store space. This involves pulling down several old buildings on Oxford street and erecting in their places modern stores. The Huntingdon Company has the contract for the first of these.

The foundations of the new buildings are about 80 ft. below the level of the street, the sub-basement floor being approximately 70 ft. below. Because of the peculiar soil conditions in London, this is an unusually deep excavation and requires heavy bracing in order that there may be no settlement of the houses which surround the property.

Capt. Huntingdon's American forethought is well illustrated by the fact that he gave directions for carrying down a big pumping outfit.

"We felt pretty sure that if we went that far below ground level some water or gas main or something else was going to break and we wanted to be ready for it."

True to his prediction, a big 8-in. water main, which supplied a large section of the Borough of St. Marylebone, gave way and several thousand gallons of water began to flood the space which had been excavated for the building foundation. The night watchman on the job immediately got Capt. Huntingdon on the telephone and the Captain communicated with the building superintendent. The man they needed most, however, was the master mechanic, who lived some distance from the job and had no telephone in his house. He was the one man in the organization who was thoroughly familiar with the pumping outfit. Captain Huntingdon thereupon directed that two things be done: first, that his chauffeur be sent with his car to the master mechanic's home, and second, that every police station in London be notified and asked to have flashed on the screen of every moving picture house a notice to the effect that Henry Donovan was wanted immediately at the corner of York and Duke streets.

True to type, the master mechanic was at a moving picture show and saw the notice flashed upon the screen within a few minutes after the alarm had been sent out. In an unbelievably short time after the water main first broke he was in charge of a gang of men starting the pumping. A squad of men from the water company followed close on their heels and long before Sunday morning the leak was stopped, temporary repairs were made, and the pit pumped dry ready for work on Monday.

Captain Huntingdon's American energy certainly saved the situation, but it is doubtful if he could have succeeded without the typical British thoroughness which made the London police willing to aid him by communicating with every motion picture house in the city. It is rather doubtful whether the police of any American city would do so good a job.

The World-Wide Guide To The ALMACOA Best Construction Machinery And Service

THE export business of the non-competing manufacturers whose advertising appears in this magazine is handled by the Allied Machinery Company of America.

Exactly the Same Service in Tokyo As in London Or New York

THE sole purpose of the Allied Machinery Company of America is to standardize Construction Machinery service the world over. In doing this, it offers users no matter what their location an equal opportunity to profitably employ their machinery.

This means not only sales service but experts in installing and operating construction machinery; in instructing users in the economies which may be effected by the proper application of machines which save labor and speed up work.

This service is setting a new standard among construction machinery users the world over.

ALLIED MACHINERY COMPANY OF AMERICA

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ENGLAND—Allied Machinery Co., Limited, 132 Queen Victoria Street, London, E. C.4. Cable Address: ALYDMACHIN

FRANCE Paris. Allied Machinery Co. de France 19 Rue de Rocroy. Cable Address: ALMACOA

INDIA—Karachi. L. R. Vinall-Moon. Cable Address: ALMACOA

ITALY—Turin—Allied Machinery Co., Corso Dante 40. Cable Address: ALMACOA

JAPAN—Tokyo—Horne Company, Limited., 67 Takiyama cho, Kyobashi-ku. Cable Address: HORNE

PERU—Lima. Cor. Ortiz & Colonge Streets. Representative, Joaquin M. de Uriarte, Engineer

PORTUGAL—Rue de Alecrim, 10 Lisbon, Monteiro Gomes, Ltd. Cable Address: TRACTORS

SPAIN—Barcelona. Plaza de Calaluna 8. Allied Machinery Company, S. A. E. Cable Address: ALMACOA

Sterling STERLING ON A WHEELBARROW MEANS

Sterling Wheelbarrow Company

NEW YORK
BOSTON
CLEVELAND

MILWAUKEE, WIS.

CANADIAN AGENTS-MUSSENS LIMITED, MONTREAL, TORONTO, WINNIPEG, VANCOUVER

DETROIT
CHICAGO
ST. LOUIS

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ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA

MORE THAN STERLING ON SILVER Sterling

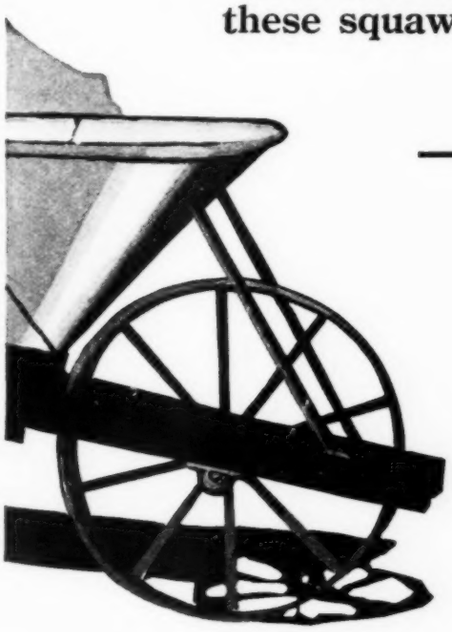
"I Want This Sterling Barrow"

"I want it, I tell you. The boss ordered it particularly for me."

"Well, you're not going to get it. What do you think I am — to hand over a barrow that wheels the easiest I ever knew; that stands up straight without tipping; that never wobbles while I'm wheeling it? Say—go chase yourself."

"Well, listen here—I got the boss to order this Sterling for me. And I am going to have it if I have to buy it. What do you think of that?"

"There's the boss now. Let's ask him to get a drove of Sterlings. Then we can do some real work and do it easier than if we had to push these squawkers around all day."



There's a reason for this universal preference for Sterlings among the men on the job. Ask them.

The six exclusive Sterling features show why Sterling Wheelbarrows mean more to buyers and to users. Get the whole story from us.

"Ask the man who pushes one"

Sterling Wheelbarrow Company

NEW YORK BOSTON CLEVELAND

MILWAUKEE, WIS.

DETROIT CHICAGO ST. LOUIS

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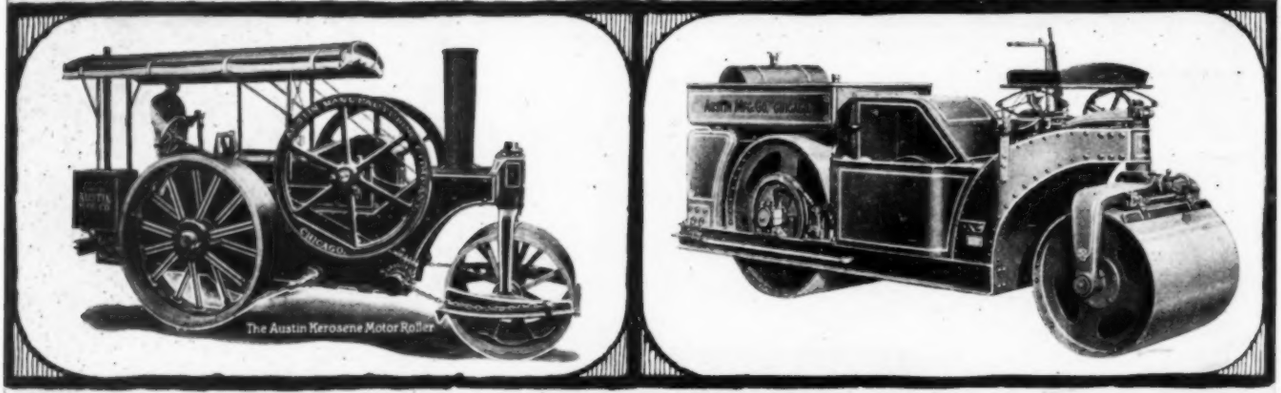
THE AUSTIN-WESTERN ROAD MACHINERY CO.



The Line of Austin Power

What Contractors Think of Austin Rollers

It's a significant fact that wherever roads are built, Austin Rollers are high in the favor of builder

Such comments as the following speak for themselves:

"This roller has been in constant service since the day it was delivered to us and we have only commendation for its performance."

"We believe that in this particular roller (Austin 10 ton, single cylinder) you have positively the best machine on the market."

These are typical of the many letters we receive. Names furnished upon request.

Motor Rollers and Steam

Austin makes a complete line of rollers for highway work, paving and repairing.

Every contractor knows the Austin Motor Roller. It has won its place as leader. The Steam roller finds as great favor where conditions call for its use.

THE AUSTIN-WESTERN ROAD MACHINERY CO.

CHICAGO

NEW YORK	BOSTON	RICHMOND	COLUMBUS	NEW ORLEANS
ALBANY	PHILADELPHIA	CHARLESTON, W. VA.	LOUISVILLE	JACKSON, MISS.
DALLAS	ST. PAUL	NASHVILLE	PITTSBURG	PORTLAND, ORE.
OKLAHOMA CITY	MEMPHIS	ATLANTA	LOS ANGELES	SAN FRANCISCO

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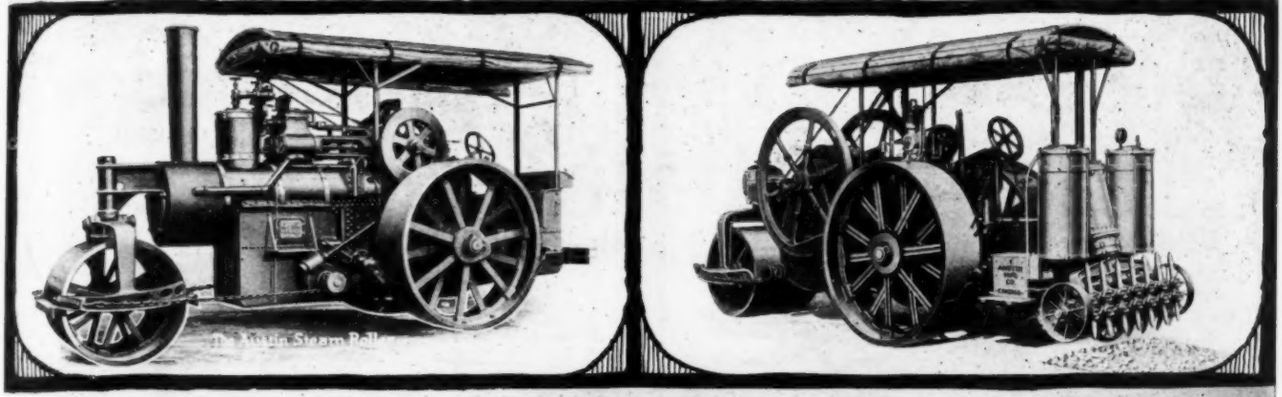

Rollers For Every Job

What Road Officials Have to Say

The best test of the standing of Austin Rollers is to ask us for a list of road officials who not only have purchased Austin Rollers but *have re-ordered them.* For that is real proof of performance.

Many of the State Highway Departments are using from one to ten and often more Austins. The county officials, too, endorse them highly. So do the municipalities. *Ten chances to one there are Austins at work almost next door to you.* Write to us at once for facts, reports from users and full details.

The Austin Catalogs

Every road official and contractor should have for ready reference the Austin Catalogs which describe in detail the Austin-Western line of road machinery.

We show below the machines that Austin-Western make. Ask for catalog covering any or all. They're yours on request. Send now —while you are thinking of it.

THE AUSTIN-WESTERN ROAD MACHINERY CO.

MAKERS OF

MOTOR ROLLERS	STONE SCREENS	STONE SPREADERS	DUMP WAGONS	ROAD PLOWS
STEAM ROLLERS	STONE ELEVATORS	ROAD OILERS	STREET SPRINKLERS	WHEELED SCRAPERS
SCARIFIERS	PORTABLE BINS	ROAD GRADERS	STREET SWEEPERS	DRAG SCRAPERS
ROCK CRUSHERS	QUARRY CARS	ELEVATING GRADERS	MOTOR SWEEPERS	

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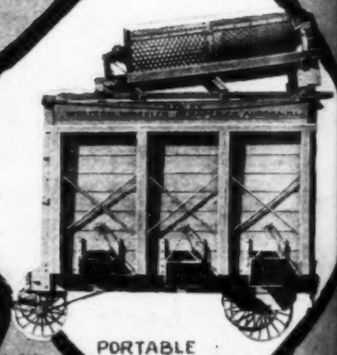
THE AUSTIN-WESTERN

For Municipal and
This Well Balanced Line - Ba

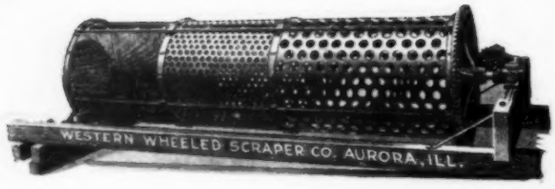
AUSTIN ROAD OILER WITH HEATER ATTACHMENT

AUSTIN ER

AUSTIN TWO SPEED SPRINKLER SWEEPER



PORTABLE BIN



WESTERN SCREEN

CHICAGO

NEW YORK	BOSTON	RICHMOND	COLUMBUS	NEW ORLEANS
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DALLAS	ST. PAUL	NASHVILLE	PITTSBURG	PORTLAND, ORE.
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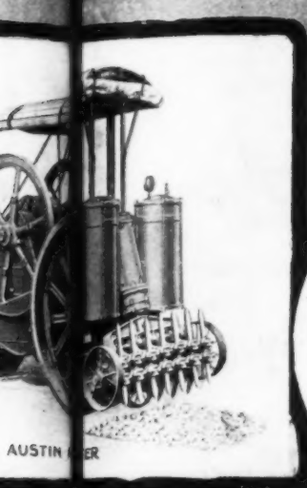
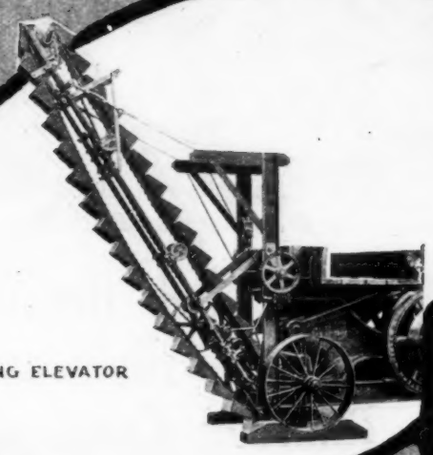
ROAD MACHINERY CO.

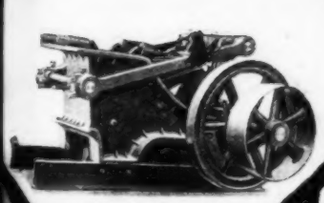
...ounty Road Work
...ad By Two Great Factories



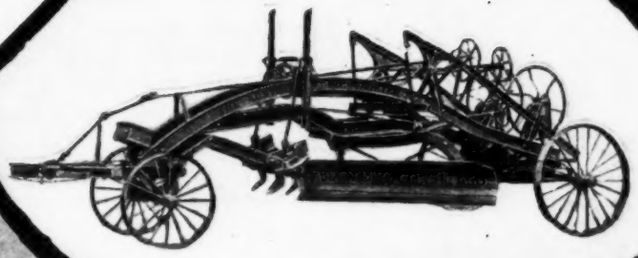


FOLDING ELEVATOR

AUSTIN MOTOR SWEEPER



AURORA TWO-BLOW STROKE CRUSHER



AUSTIN RIP SNORTER

MAKERS OF

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STEAM ROLLERS	STONE ELEVATORS	ROAD OILERS	STREET SPRINKLERS	WHEELED SCRAPERS
SCARIFIERS	PORTABLE BINS	ROAD GRADERS	STREET SWEEPERS	DRAG SCRAPERS
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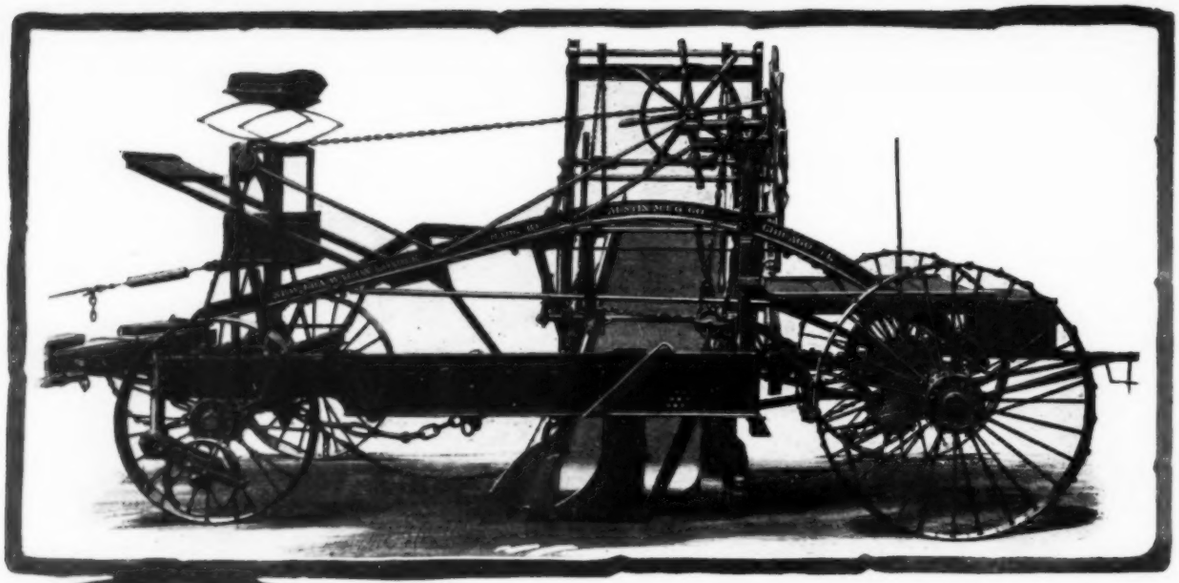
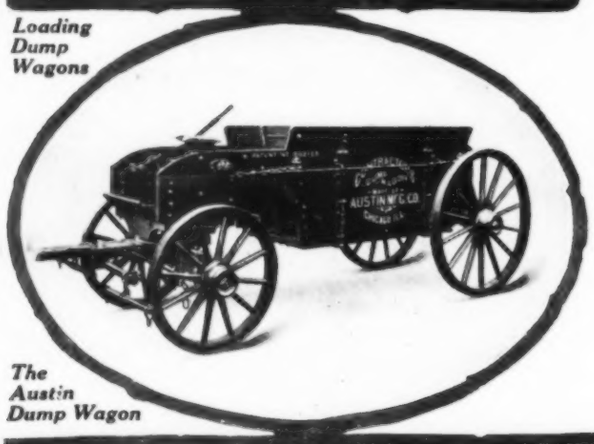


In Action

Loading Dump Wagons



The Austin Dump Wagon

Making the Dirt Fly on Highway and Railroad Construction Work

YOU old-time contractors who know the game inside and out don't have to be told about the New Era Elevating Grader. You know it's a fundamental need in building profits.

So, too, with Austin Dump Wagons. But we are all too apt to forget old friends. So here are the "whys and wherefores."

The New Era Elevating Grader

Moves more than 1000 cubic yards in an ordinary working day, and does it so easily, quickly and cleanly that you hardly realize the great volume of work done.

It loads your wagons — keeps them jumping to match its pace.

It cuts digging and handling costs way down — and here is where your profit is made or lost — on that grading job.

Austin Dump Wagons

These sturdy, easily handled wagons are fit companions for the "New Era" Grader. They dump easily and quickly. Never lose time in stopping the team or fussing around.

They're built right to give real service. Ask for catalogs describing Austin Equipment.

AUSTIN MANUFACTURING COMPANY

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Montreal Toronto Winnipeg Vancouver

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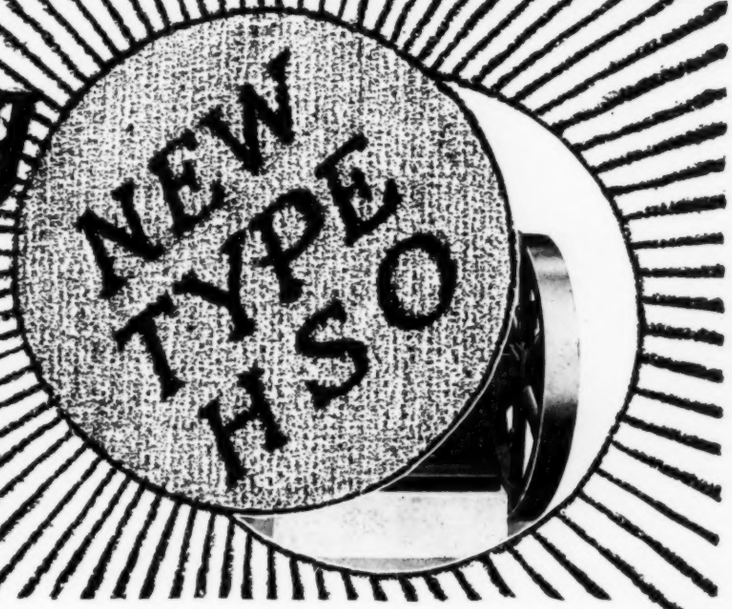
Forcasting an Eclipse



Just as surely as an astronomer can forecast an eclipse of the sun, so can we look into the future and foretell the coming eclipse of all our past best efforts in engine building by our New Type H S O. We have built good gas engines in the past. Cook Engines have built up a reputation we can well be proud of. Even so, we can truthfully say that our New Type H S O will far surpass any model previously made by us. Here are some of the reasons why:

The New Type H S O

1—It runs on kerosene.
2—Easily started—has auxiliary gasoline cup.
3—Inverted type of carburetor—no flooding when running light.
4—Mechanically operated valves—both intake and exhaust.
5—Forced feed lubrication.
6—Complete high tension ignition system.
7—Hopper cooled.
8—Top and bottom halves of main bearing interchangeable.

New Cook Engine Outshines All Others

The New Type H S O will prove a rugged, reliable and economical gas engine for the contractor—or anyone—who wishes a 12 H. P. gas engine for hard, continuous, heavy-duty work.

Write for further information about this new model. Get your inquiry to us early—we are quite sure we will be unable to take care of the demand for the New Type H S O.

Cook Motor Company

Delaware, Ohio

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PARSONS

If You Could Only See Your

Details in Construction

IF you could only see your trench machines in the making you'd have the explanation to a lot of things that puzzle you now.

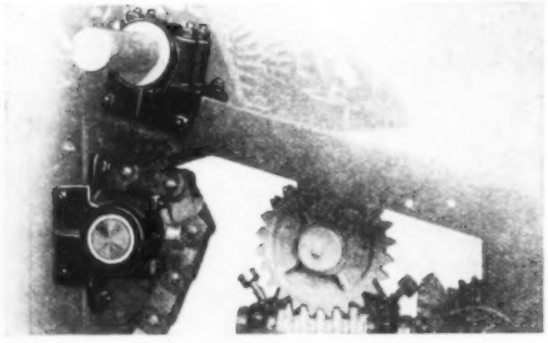
You'd know why some trench machines rack themselves to pieces quickly without apparent rhyme or reason; why some—Parsons, as a usual thing — never seem to tire no matter what the task they're given.

For the little things—the details—in construction are the big factors in operation.

We could take hundreds of dollars out of *our* cost on every Parsons Machine without your seeing the difference on the surface.

But you'd soon see it when you put your Parsons to work; it would behave like an ordinary trench machine—not a Parsons. And these details would be the cause.

A fact —
"After You've Picked a Parsons You Stop Picking"



What Machining Castings Means Here

Parsons Castings are *machined* after annealing; they fit true with no chance for play and consequent vibration.

Note these bearing mountings; any play here would quickly throw the bearings out of alignment — shake the machine to pieces — cause grave trouble.

Plain annealed castings at points like these with roughened or burred surfaces will not do for Parsons standard—Parsons Castings are machined —a vivid illustration of a detail in construction which plays a big part in operation.

The Parsons Company

NEWTON, IOWA, U.S.A.

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PARSONS

Trench Machines In The Making

Big Factors In Operation

WE illustrate here two points in Parsons Construction and the part each plays in the service you get from a Parsons Excavator.

Remember, please, that Parsons castings are made, annealed and machined right in our plant under our constant supervision.

The usual practice is to buy castings at one place; buy the annealing at another and more often than not to neglect entirely the machining.

Did we follow ordinary practice, Parsons Excavators would be ordinary machines; not the kind you know today.

We build an excavator with your work in mind — buy yours with our work in mind.

These details of construction are for you —be sure you get them.

A fact —
"After You've Picked a Parsons
You Stop Picking"

Parsons Castings Coming Through Annealing Process in Our Plant

Every casting in a Parsons Excavator or Back Filler is made from start to finish in our plant under our supervision.

We do the casting; and the annealing (shown above). Every step is taken here under our eyes —these processes are too important to trust to others.

It would be cheaper, yes — and simpler — to buy this work instead of doing it; cheaper for us but you would pay dearly for our saving.

The Parsons Company

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Carbic

Back of the Carbic Light Is the Carbic Cake!

CLEAR white brilliance. Steady flame. Simplicity and safety in handling. Carbic Cakes make possible the exceptional performance of Carbic Lights on all kinds of construction jobs from coast to coast. The most efficient and economical method of portable lighting.

There's a mighty interesting story about the Carbic Cake and the Carbic Light—it's an important story, too. Hundreds of contractors have heard it and that's why so many Carbic Lights are working for them now. Ask us for the whole story.

CARBIC MANUFACTURING COMPANY
DULUTH, MINNESOTA

Sales Offices:

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Boston, 27 School Street
Chicago, 111 West Washington Street
Philadelphia, 18 South 7th Street

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